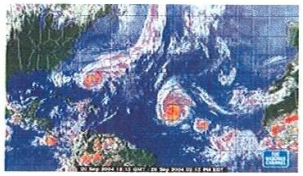
Transforming Government Communications Systems

Joint C4ISR Symposium – Mr. Mike Regan

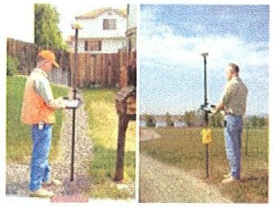
April 2005

Today's World Depends On Space Capabilities

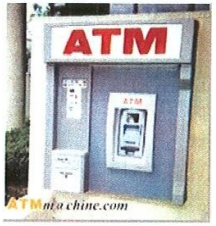
Weather
- Daily Forecasting
- Hurricane Prediction
- Climate Monitoring



Navigation
- Air, Sea, and Land
- Personal GPS
- Surveying

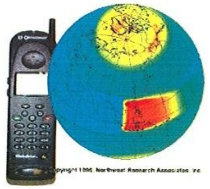


Finance
- Banking Transactions
- Automated Teller Machines



Broadcasting
- Television
- Satellite Radio

Communications
- Satellite Telephony
- Scintillation Forecasts



Remote Sensing
- Agriculture
- Mineral (oil/gas/coal /metals)

Science
- NASA-led Research
- Private & University Research

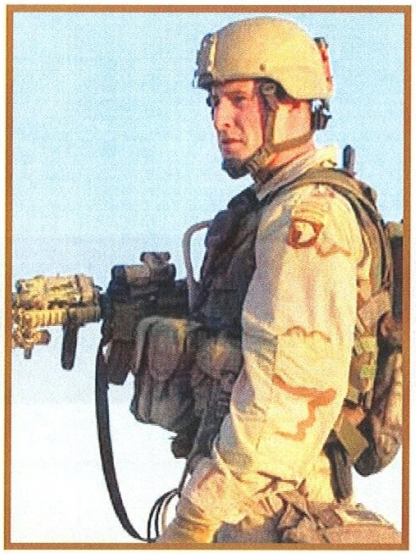
Space Launch
- Large and Small Payloads
- Space Tourism

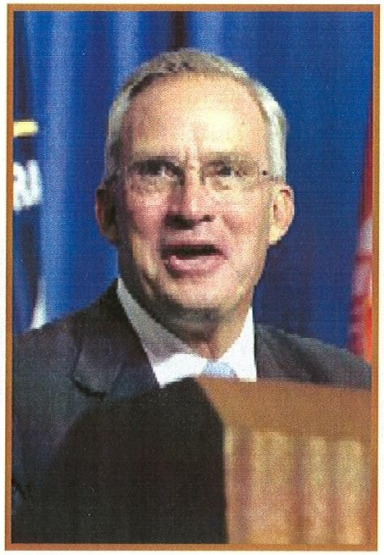
Defense and Intelligence Decision Makers Depend On Space

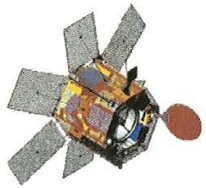
Surveillance & Warning

Launch

Positioning, Navigation, & Timing

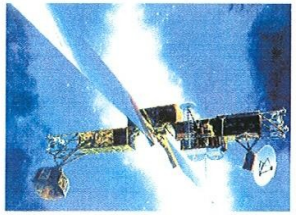






Reconnaissance & Intelligence

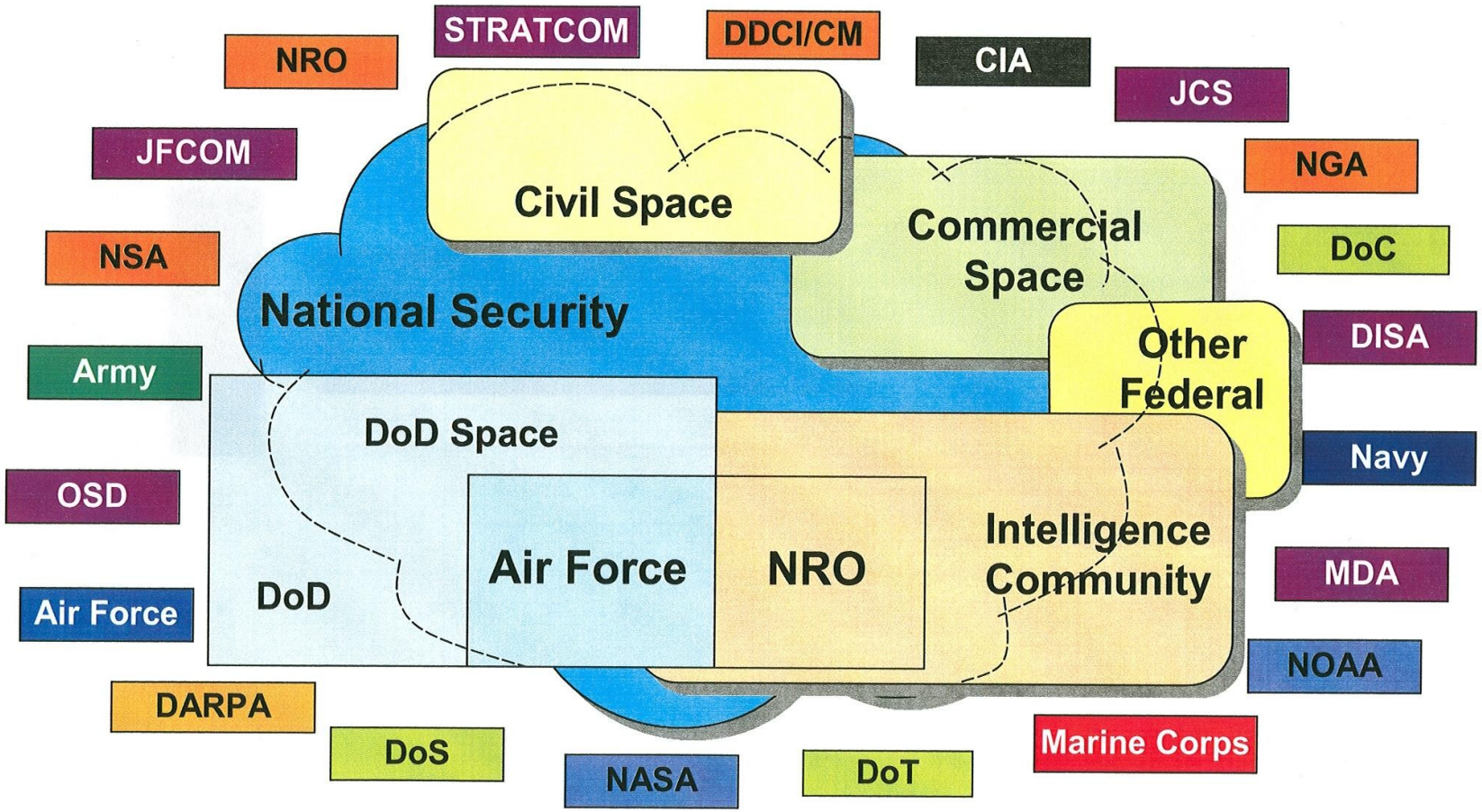
Space Situation Awareness



Communications

Weather

Complex Space Community



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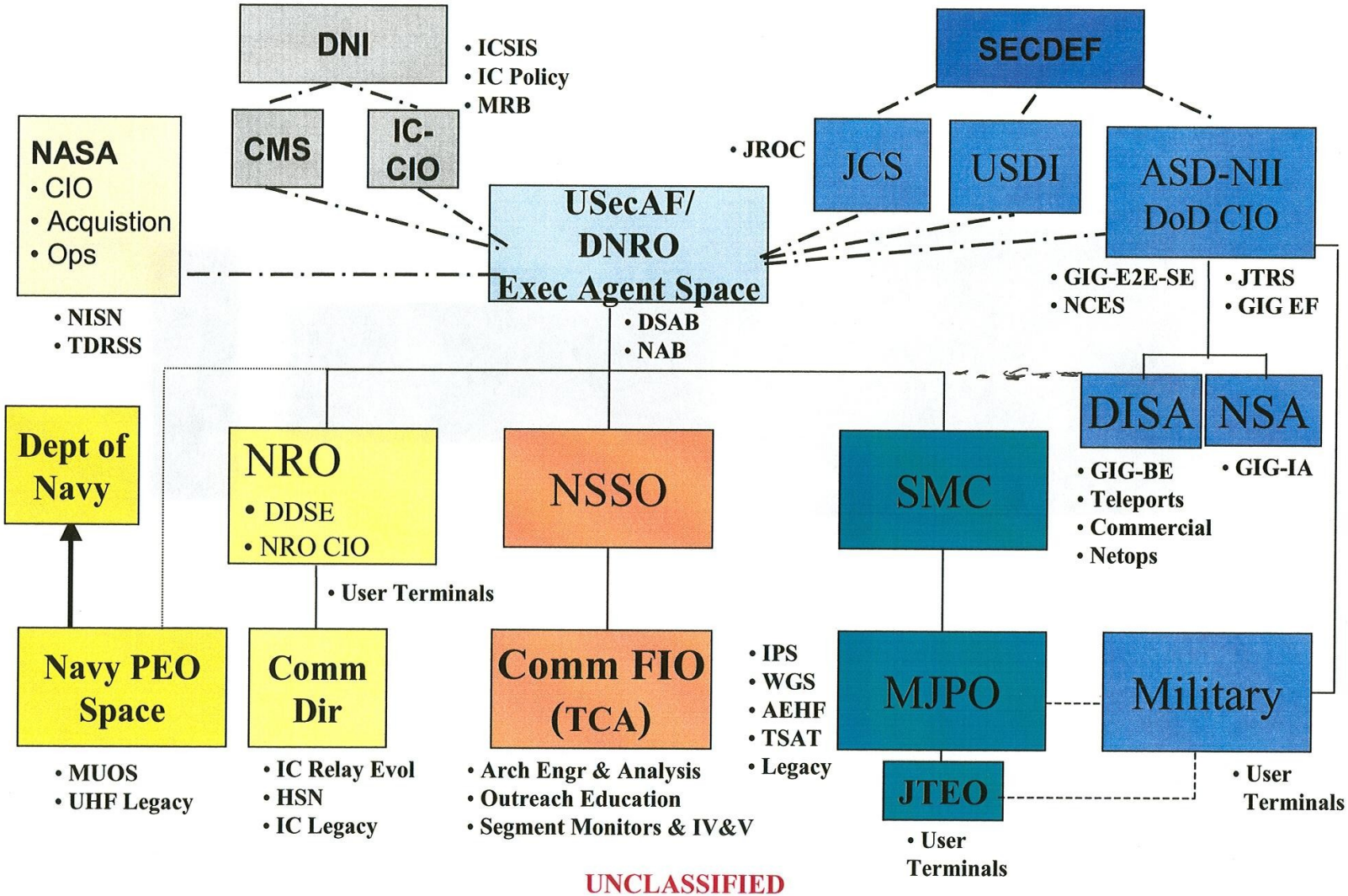
TCA Organizations



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" The truly transformational things, conceivably, might be in information technology and information operations and networking and connecting things in ways that they function totally differently than they had previously...Possibly the single most transforming thing in our force will not be a weapon system, but a set of interconnections and a substantially enhanced capability because of the awareness it provides"

Secretary of Defense Donald H. Rumsfeld, 9 Aug 2001

"It doesn't sound like an exciting topic or mission, but for my money, there's nothing more critical than how we command and control our forces. And communication systems are the heart of command and control. If you can't get the word out, you don't really have control."

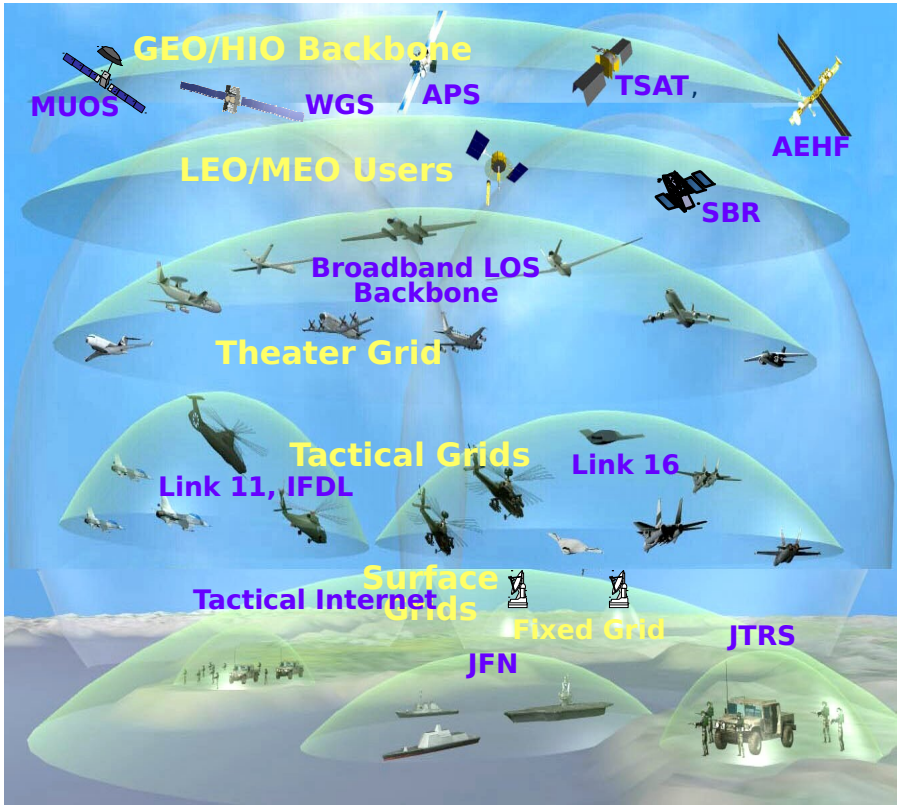
Gen Richard Myers
Chairman, Joint Chiefs

12 May 2003

Transformational Communications Vision

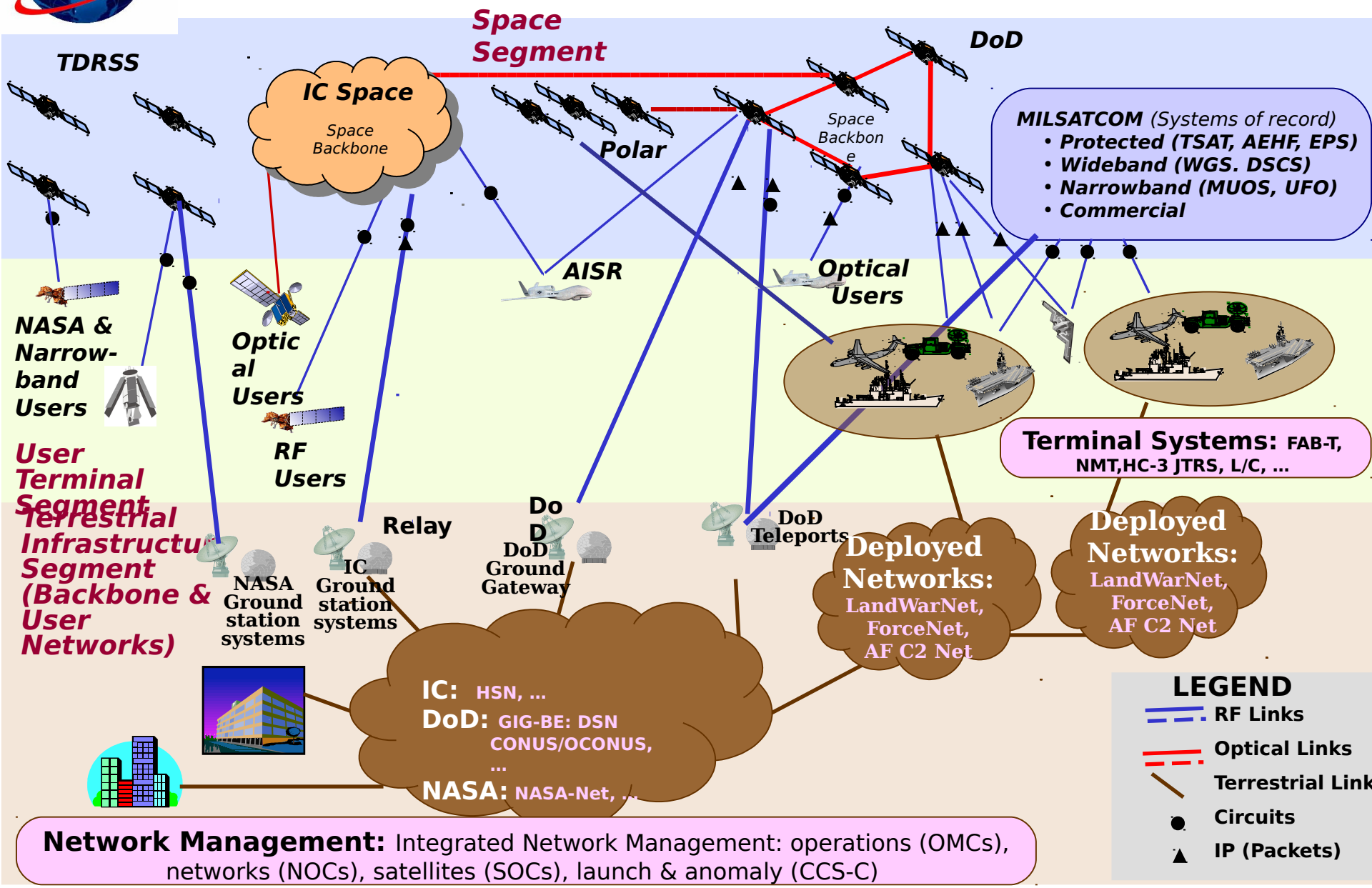
An internet-like transport architecture between space, air and ground nodes

- **Integrated Space, Air and Ground Networks**
- **Global access to deployed / mobile Users (COTM)**
- **Timely delivery of air and space data to Theater and CONUS (AISR, SISR support)**
- **Increased capacity and connectivity: RF and laser communications network**



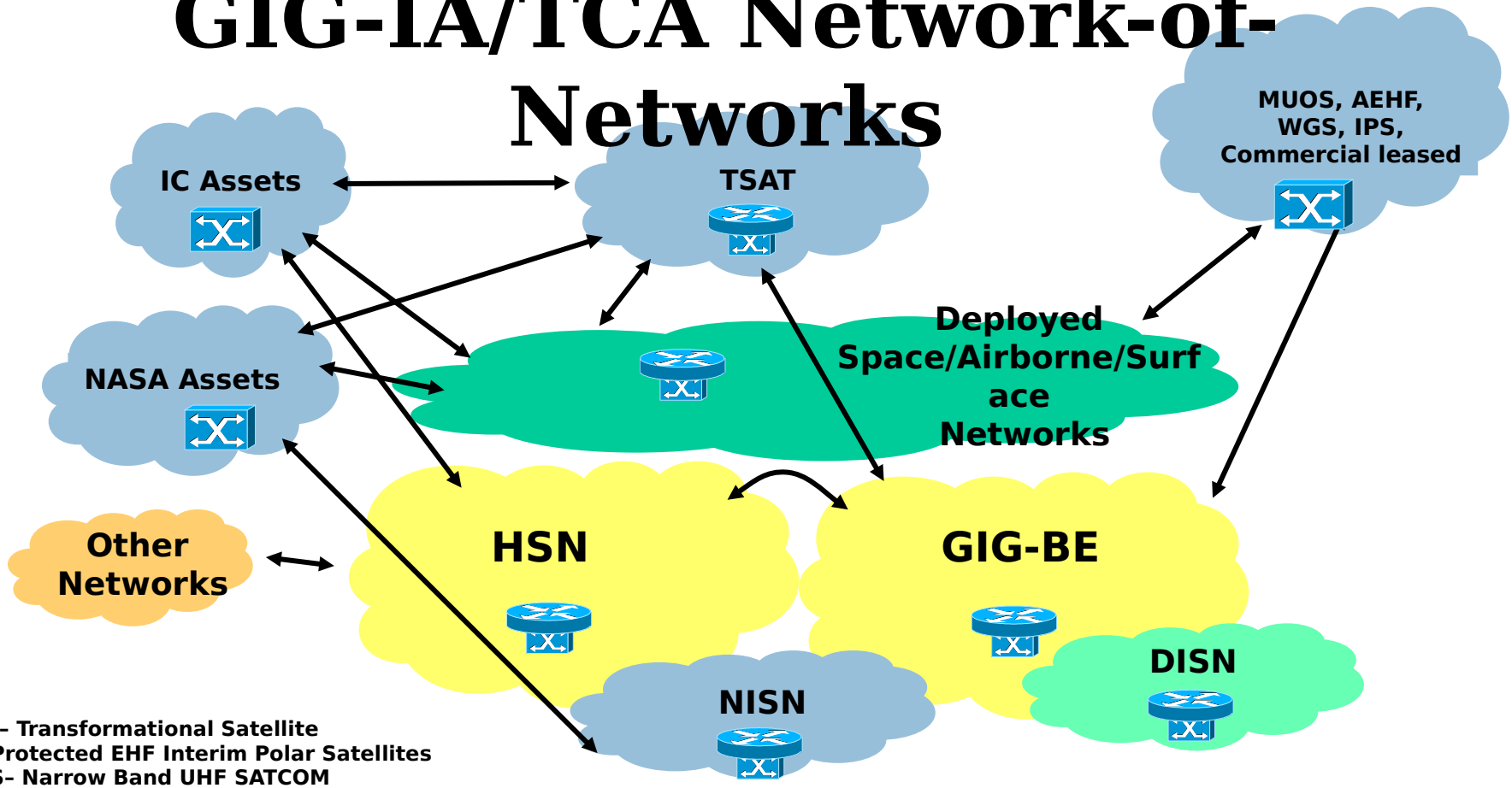
Goal: Remove Communications as a constraint to the user

TCA Overview 2020



Network Management: Integrated Network Management: operations (OMCs), networks (NOCs), satellites (SOCs), launch & anomaly (CCS-C)

GIG-IA/TCA Network-of-Networks

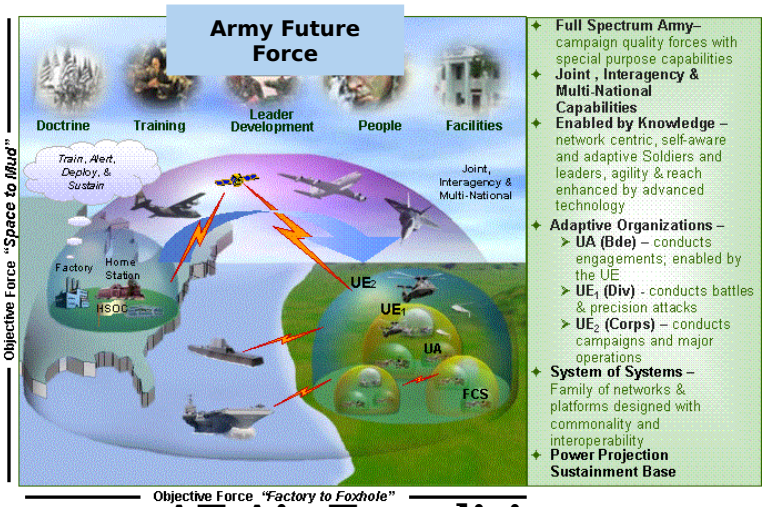


TSAT – Transformational Satellite
IPS –Protected EHF Interim Polar Satellites
MUOS– Narrow Band UHF SATCOM Satellites
WGS - Wideband Gap Filler Satellites
IC – Intelligence Community
HSN – IC High Speed network
NISN – NASA Information Services Network
DISN – Defense Information Services Networ

Different Enclaves and Domains Operating as a Single Network End-to-End

TCA Supports Multiple Military Service Visions

Army Future Force


Army Future Force
Doctrine
Training
Leader Development
People
Facilities
Train, Alert, Deploy, & Sustain
Joint, Interagency & Multi-National
Factory
Home Station
HSOC
UE2
UE1
UA
FCS
Objective Force "Space to Mud"
Full Spectrum Army– campaign quality forces with special purpose capabilities
Joint , Interagency & Multi-National Capabilities
Enabled by Knowledge – network centric, self-aware and adaptive Soldiers and leaders, agility & reach enhanced by advanced technology
Adaptive Organizations –
UA (Bde) – conducts engagements; enabled by the UE
UE1 (Div) - conducts battles & precision attacks
UE2 (Corps) – conducts campaigns and major operations
System of Systems – Family of networks & platforms designed with commonality and interoperability
Power Projection Sustainment Base
Objective Force "Factory to Foxhole"

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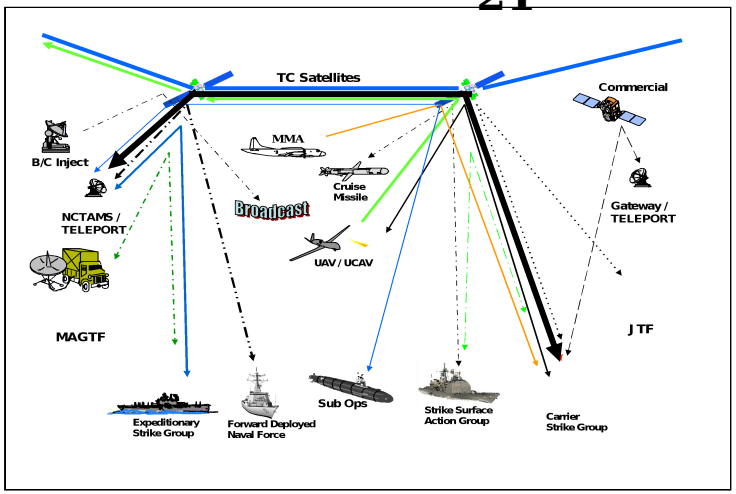
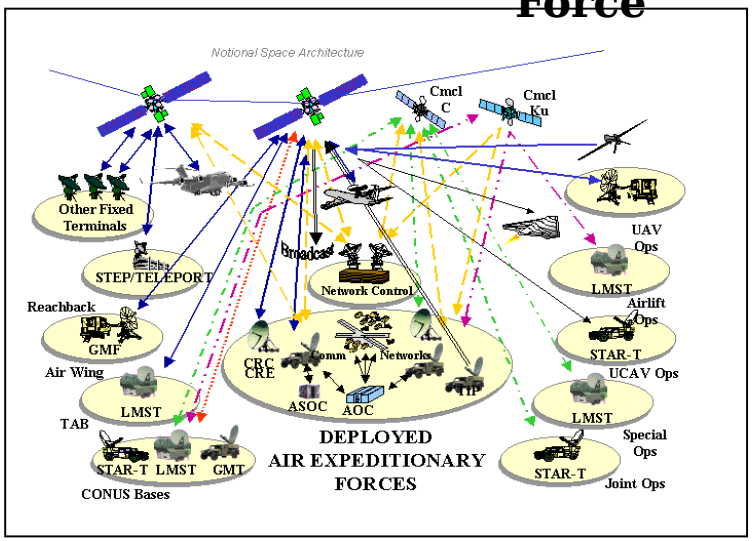
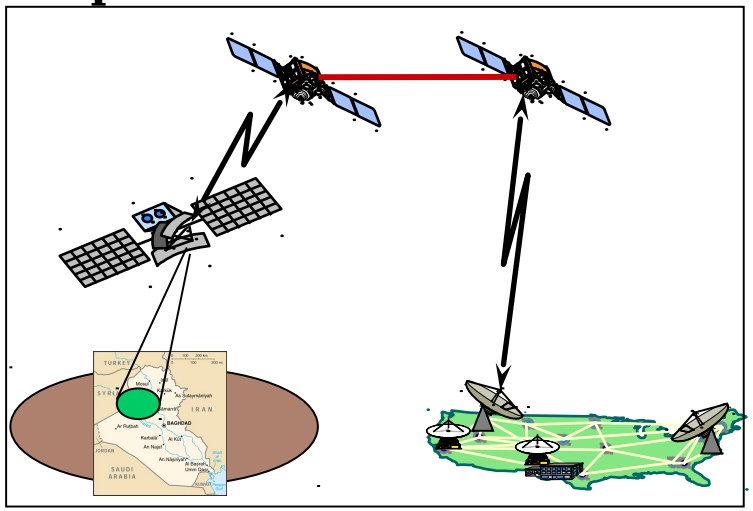
Navy SeaPower 21



AF Air Expeditionary Force

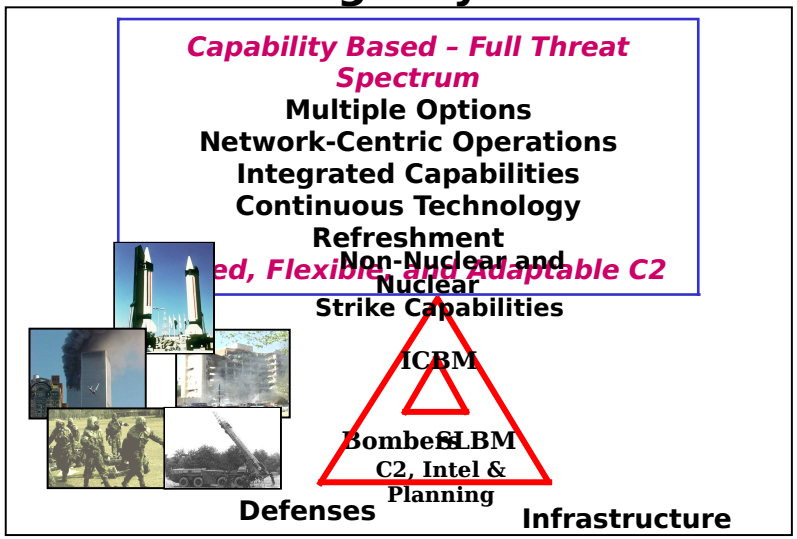


Space Based Radar – MTI

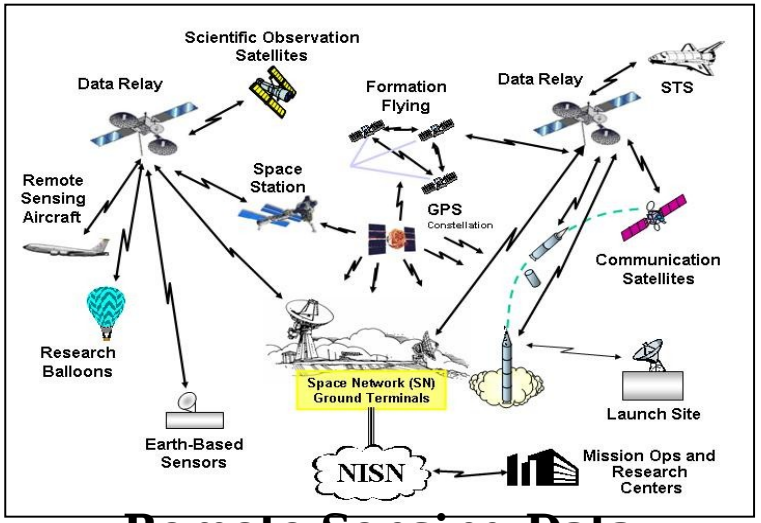


TCA Supports National & Civil Space Visions

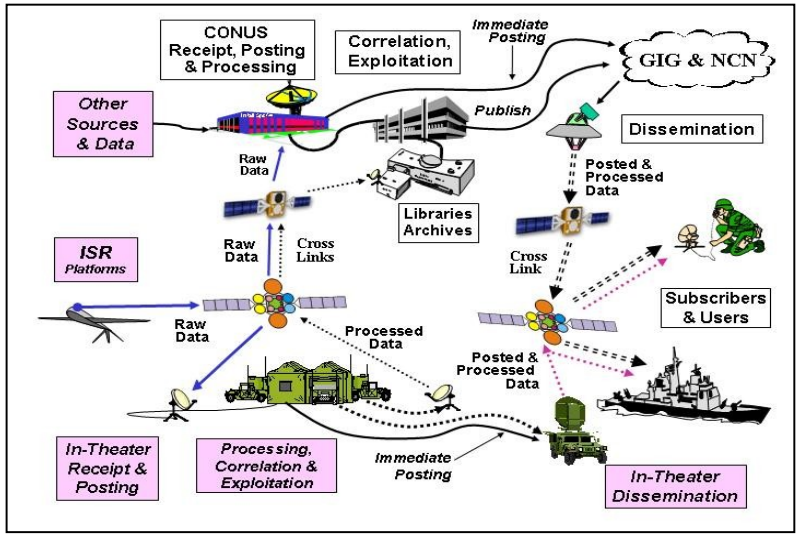
Strategic Systems



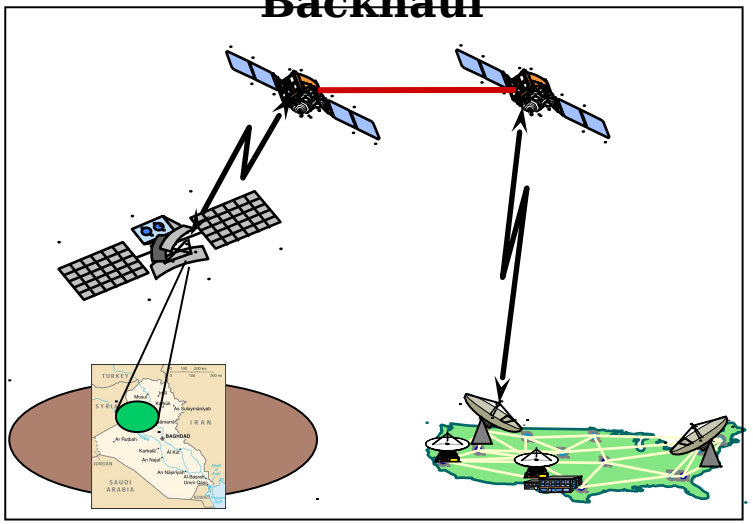
NASA Missions



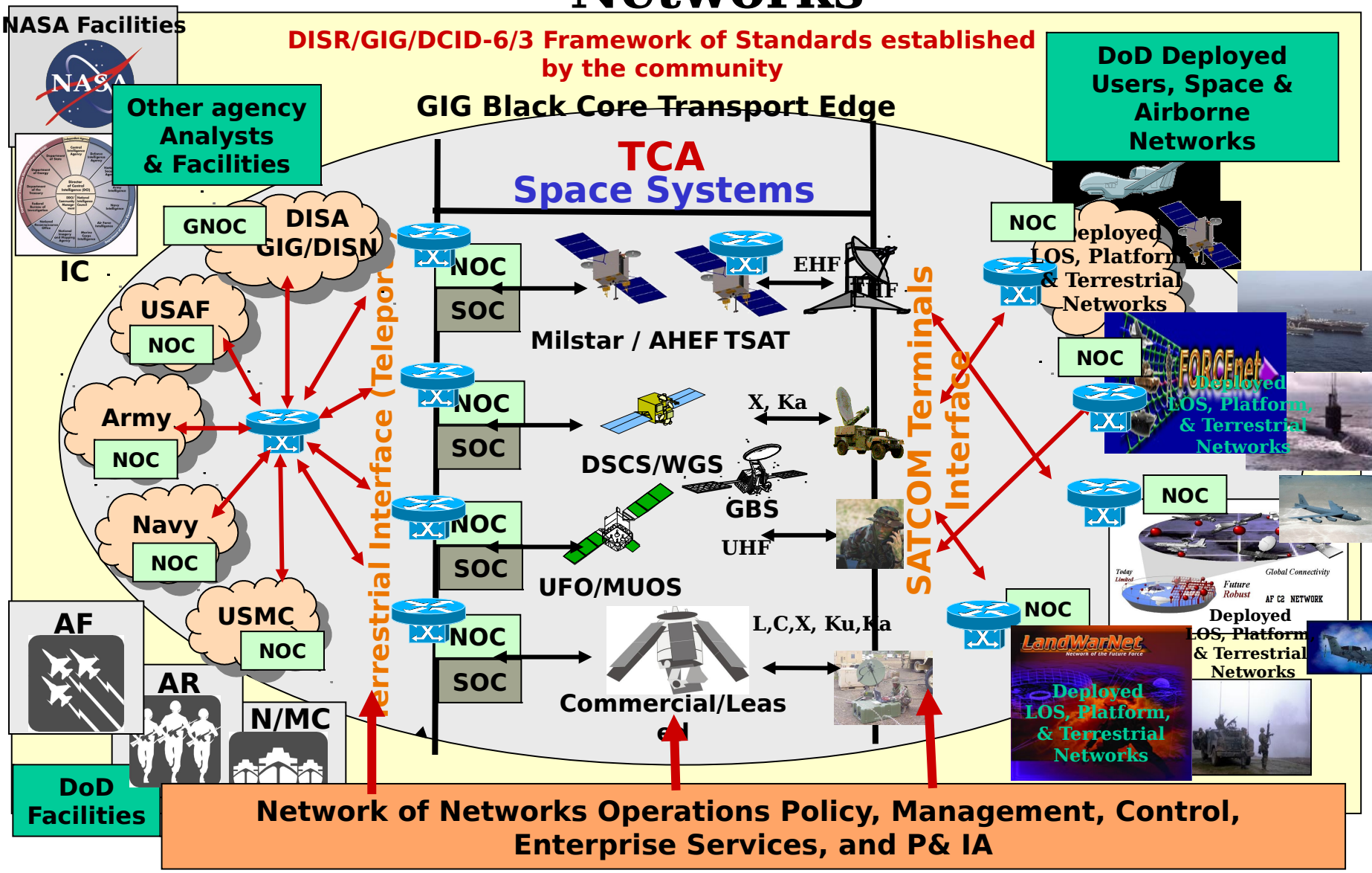
IC Missions



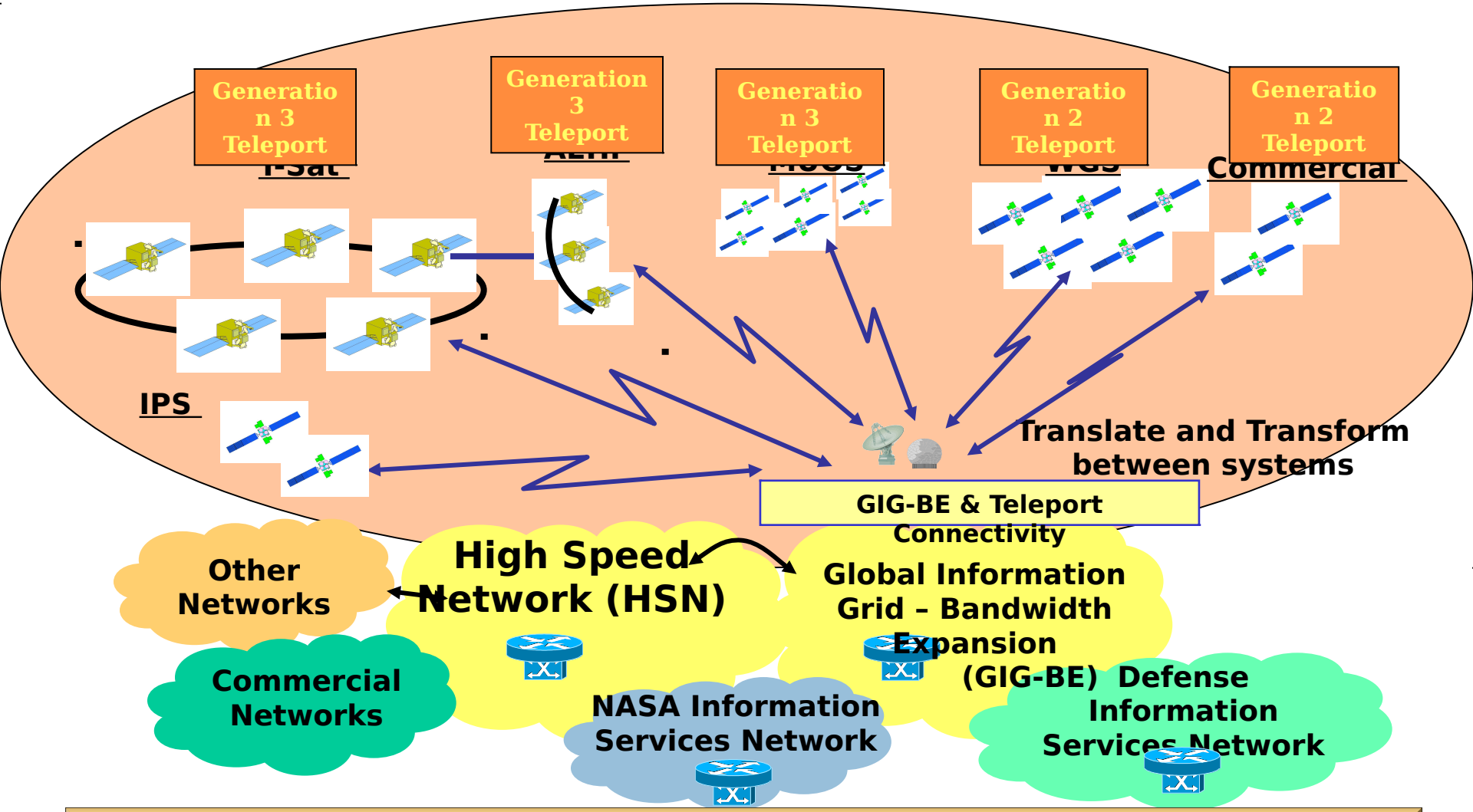
Remote Sensing Data Backhaul



System of Systems – Network of Networks

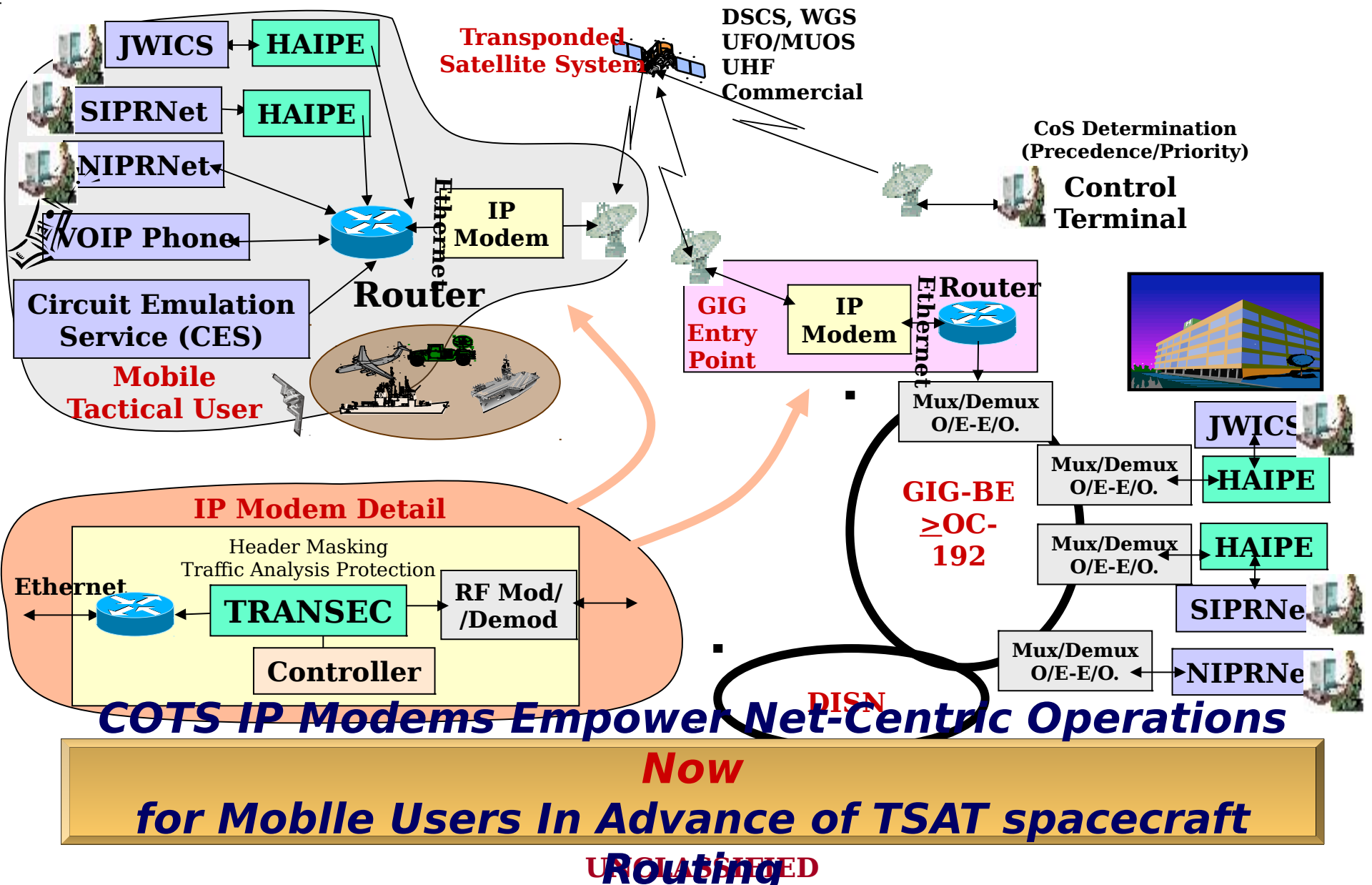


AEHF–MUOS–WGS Connect to TCA Network via Teleports



End-to-End Network Connectivity

IP Modems – "Baby Steps" to IP Convergence and Net-Centric Warfare – End-to-End



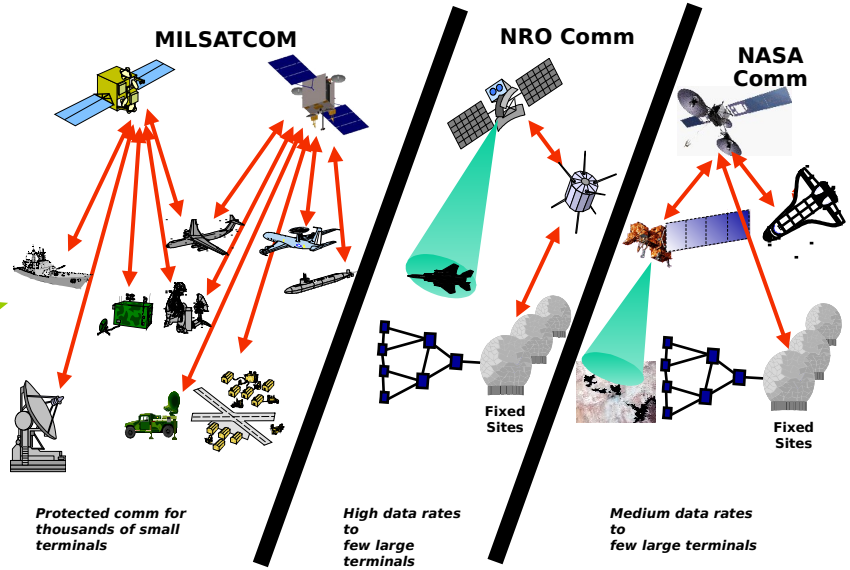
COTS IP Modems Empower Net-Centric Operations Now for Mobile Users In Advance of TSAT spacecraft Routing

Transformational Communications Architecture – An Opportunity for Change

Path Without TCA

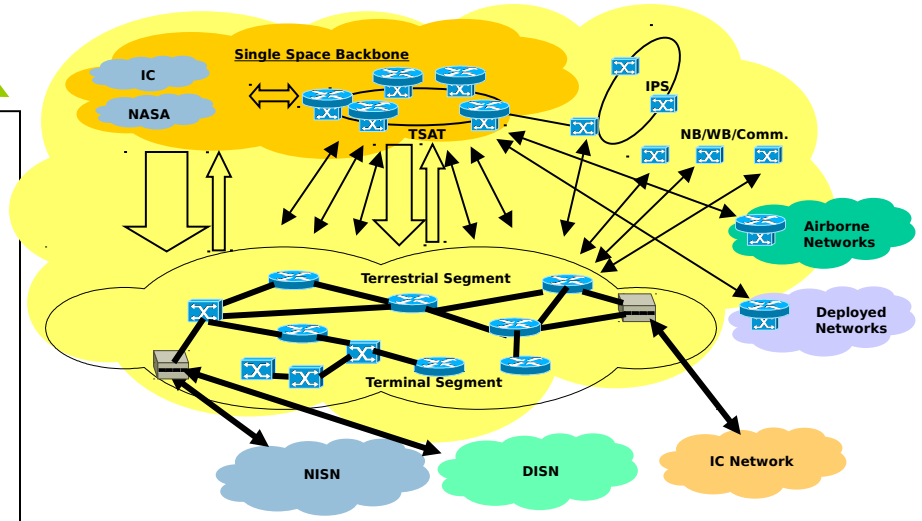
- Enhanced capabilities within stovepipes
- Very limited Interoperability with segregated svcs
- Sensor to Shooter Latency
- Non-synchronized Terminal Developments
- Limited ability to support emerging Information Dissemination Management (IDM) vision

Large Communication Investment



Path With TCA

- Enables Network Centric Operations
- Standards Based Interoperability and Integrated Services
- Increased communications connectivity and capacity
- Robust, adaptable, dynamic and flexible network services
- Integrated Operations Centers
- Accommodates Multi Security Levels
- Enables new information exploitation models, i.e. fusion



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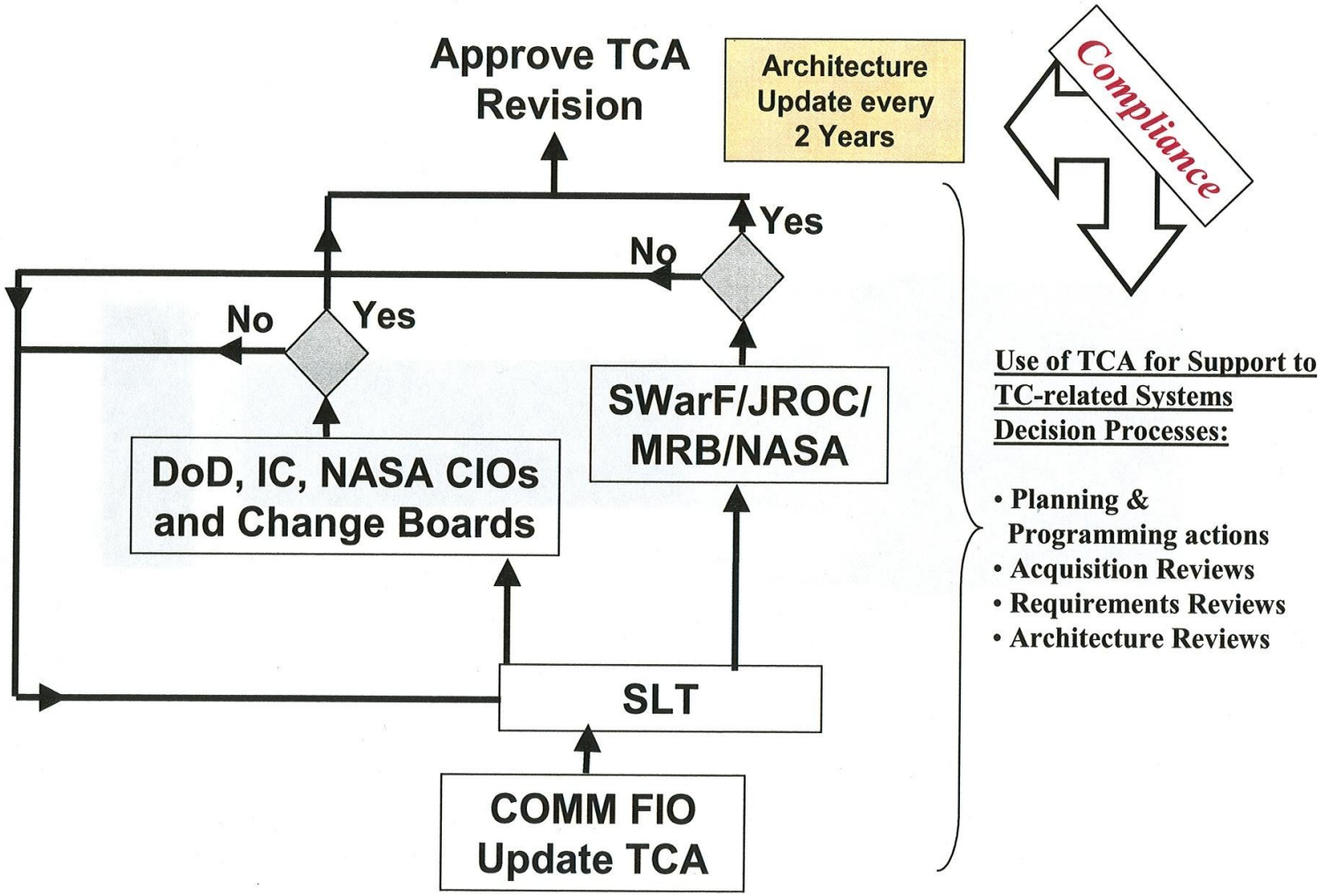
TCA Governance



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Summary for TCA

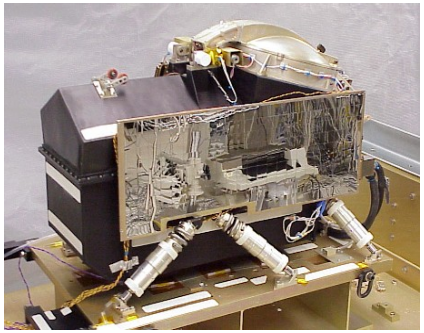
- We have a national imperative to interoperate and be capable of reliably sharing information across Intelligence, Defense, Homeland Security,State Department, and Law Enforcement

  - The GIG-IA/TCA provides the communications transport infrastructure through space to deployed, moving, and mobile users to enable routine seamless information sharing between DoD elements and the greater National community

  - The establishment of the Government-Wide Security Policies and Communications Standards

Backup Charts

Key Technology Enablers



Laser Communications

Packet based Multiple-Access (S/C IP Routing)

Bandwidth Efficient Protected Communications

Multiple-Secure-Levels, Separation by Key

Autonomous ground stations

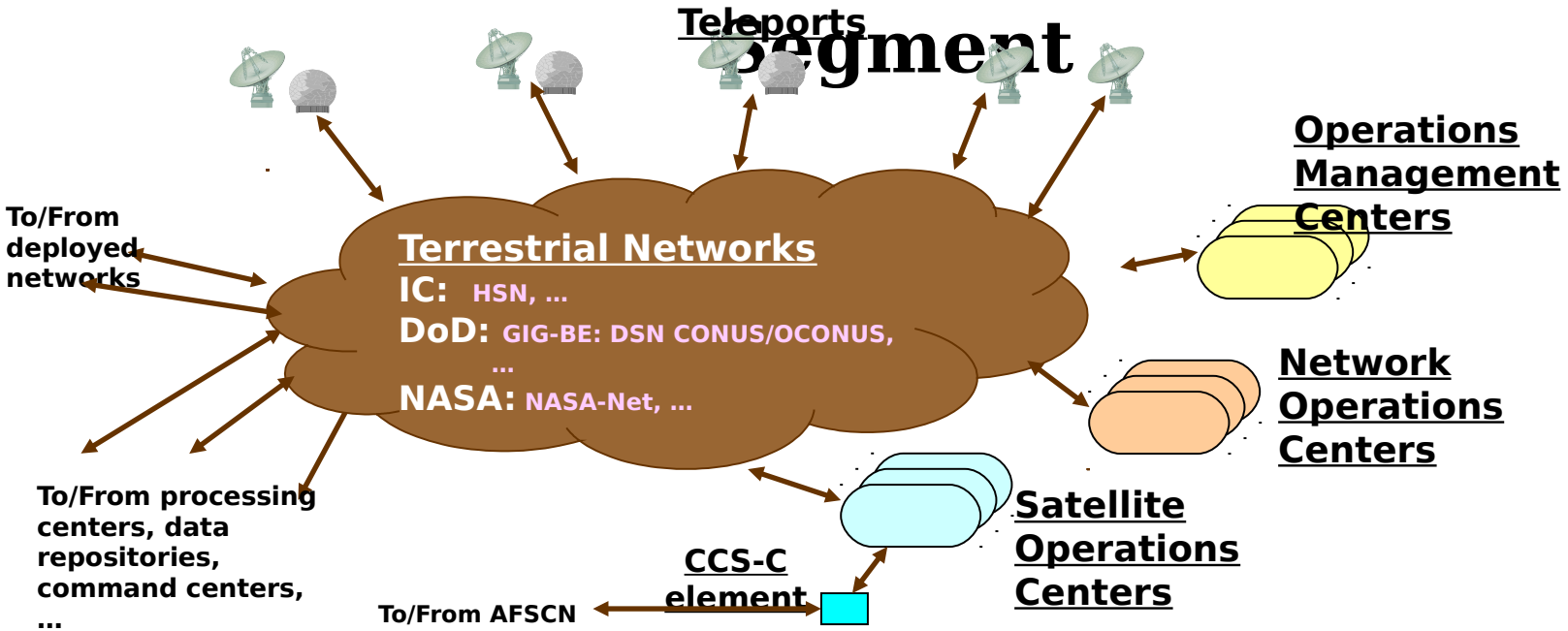
Agile Antenna Technology, COMM on the Move

Advanced Multi-Beam Technology

Multiple Access Optical communications

High Capacity Bandwidth Efficient RF Link Technology

Terrestrial Infrastructure Segment



Teleports:
- Enables space-ground backbone connectivity
- Interoperable among service organizations

- Enables connectivity among DoD space elements (WGS, UFO, AEHF, TSAT), GIG-BE, and commercial

Terrestrial Networks:
- Provide connectivity among segment elements
- Upgraded to facilitate TCA

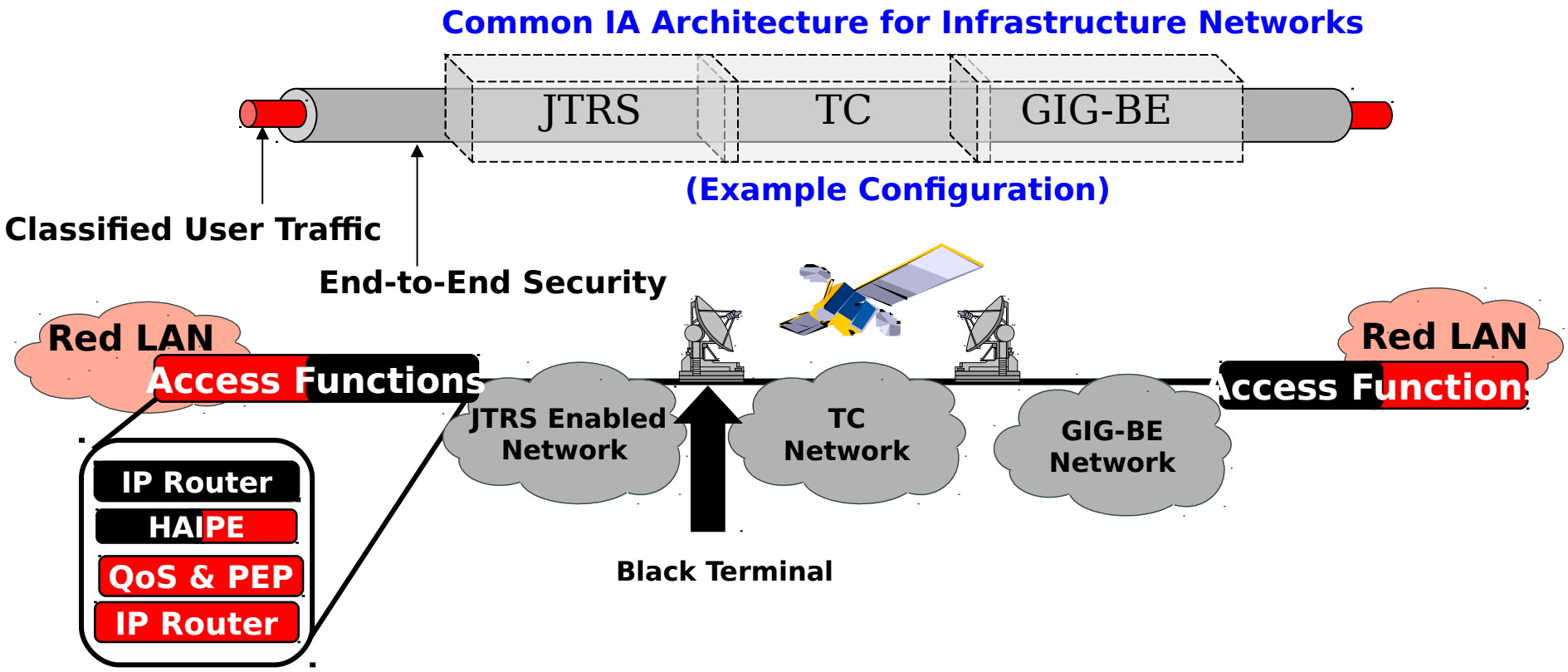
Operations Management Center (OMC):
- Operations planning
- Service assignment & adjudication
- Policy-based network management profiles
- Global monitoring of TCA

Network Operations Center (NOC):
- Mission planning
- Network configuration
- Communications network management
- Key management
- Resource performance monitoring
- Accounting

Satellite Operations Center (SOC):
- Anomaly resolution
- Orbit determination & ranging
- Launch & early orbit ops
- Relocation activities
- Collision avoidance activities

Command Control System – Consolidated (CCS-C) Element:
- Enables platform C2 via AFSCN
- Facilitates anomaly resolution and launch & early orbit ops

Black (Unclassified) Transport Edge-to-Edge



HAIPE: High Assurance Internet Protocol Encryptor

GIG-IA/TC uses a "Black Core" to support multiple security levels (Unclassified Transport)